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1 **ELECTRONIC PROGRAM GUIDE SUBSYSTEM FOR RECEIVING AND**
2 **PROCESSING ELECTRONIC PROGRAM GUIDE INFORMATION FROM A**
3 **SET-TOP BOX**

4
5 Background of the Invention

6 Field of the Invention

7 The present invention relates to information storage and display systems, and
8 more particularly, to video display systems that record information relating to video
9 programming.

10 Description of the Related Art

11 Digital video recording systems provide the capability of concurrently recording
12 incoming broadcast audiovisual data using hard disk drive technology and playing back
13 previously recorded audiovisual data. A digital video recording system receives
14 incoming broadcast audiovisual data from the output interface of a set-top box
15 configured to receive the broadcast audiovisual data from a service provider, such as a
16 cable or satellite television system. The output of the digital video recording system is
17 then transmitted to a display device, such as a television. Such set-top boxes typically
18 have only one input interface that receives the broadcast audiovisual data and one output
19 interface that transmits the broadcast audiovisual data. In response to commands from
20 the user, the digital video recording system transmits to the display device either the
21 incoming broadcast audiovisual data from the set-top box or the previously recorded
22 audiovideo data.

23 Set-top boxes are configured to receive electronic program guide (EPG)
24 information from the service provider to provide broadcast scheduling information to
25 the user. EPG information typically includes the title and broadcast times for the
26 scheduled broadcast programs on each channel for a span of days, e.g., the next two
27 weeks. In addition, the EPG information may include other information of potential
28 interest to a user, such as the program genre, cast and director, brief synopsis, etc.

29 Typically, the EPG information is transmitted by the service provider to the set-
30 top box over the same input line as is the broadcast audiovisual data. The EPG

1 information is typically sent in a "carousel" configuration, in which, for example, the
2 broadcast schedules for each day of the next two weeks are transmitted sequentially.
3 Once the full two-week schedule has been transmitted, the cycle begins again, including
4 any updated information, thereby continually providing the set-top box with up-to-date
5 EPG information. The set-top box is configured to recognize the EPG information,
6 extract it from the incoming data, and store a portion of the EPG information to resident
7 random-access memory (RAM). In response to commands from the user, the set-top
8 box displays the EPG information on the television in a format determined by the
9 service provider.

10 Known digital video recording systems provide broadcast scheduling
11 information to either the user or resident software programs via a modem that is
12 configured to receive EPG information from an external source. For example, the
13 digital video recording system includes an internal modem that is connected to a
14 telephone line in order to make periodic (e.g., daily) phone calls to an affiliated provider
15 to receive updated EPG information, which is then stored on an internal hard disk drive
16 and used to provide broadcast scheduling information at later times. These periodic
17 connections to the affiliated provider may also be used to transmit software updates to
18 the digital video recording system, and are a potential conduit of advertising
19 information from the affiliated provider to be displayed to the user.

20 In addition to utilizing a different source of EPG information than the service
21 provider, such digital video recording systems are currently configured to utilize their
22 own format for the display of EPG information to the user, which is typically different
23 from the format used by the service provider for displaying EPG information. Also,
24 while the user is viewing the EPG information, the digital video recording system is in
25 control of the information being displayed to the user, thus taking this control from the
26 broadcaster or service provider.

27 Summary of the Invention

28 The present invention may be regarded as a digital video recorder connectable to
29 a set-top box configured to receive electronic program guide information and broadcast
30 audiovisual data. The set-top box includes at least one auxiliary interface that supports

1 communication between the digital video recorder and the set-top box. The digital
2 video recorder comprises a storage device and at least one recorder interface
3 connectable to the auxiliary interface. The digital video recorder further comprises an
4 electronic program guide subsystem connected to the recorder interface to receive the
5 electronic program guide information from the set-top box and to process the electronic
6 program guide information to schedule recording the broadcast audiovisual data on the
7 storage device.

8 The present invention may also be regarded as an electronic program guide
9 processing device connectable to a set-top box configured to receive electronic program
10 guide information. The set-top box includes at least one auxiliary interface that
11 supports communication between the electronic program guide processing device and
12 the set-top box. The electronic program guide processing device comprises at least one
13 device interface connectable to the auxiliary interface. The electronic program guide
14 processing device further comprises an electronic program guide subsystem connected
15 to the device interface to receive and process the electronic program guide information
16 from the set-top box .

17 The present invention may also be regarded as a method for communicating
18 electronic program guide information from a set-top box configured to receive the
19 electronic program guide information to a digital video recorder comprising an
20 electronic program guide subsystem. The method comprises connecting at least one
21 recorder interface of the digital video recorder to at least one auxiliary interface of the
22 set-top box, the recorder interface being connected to the electronic program guide
23 subsystem. The method further comprises recognizing the connection of the digital
24 video recorder to the set-top box. The method further comprises communicating the
25 electronic program guide information from the set-top box to the electronic program
26 guide subsystem.

27 Brief Description of the Drawings

28 Figure 1 schematically illustrates a digital video recorder in accordance with an
29 embodiment of the present invention, the digital video recorder connectable to a set-top

box configured to receive electronic program guide information and broadcast audiovisual data.

Figure 2 schematically illustrates an electronic program guide subsystem compatible with the preferred embodiment of the present invention.

Figure 3 schematically illustrates an electronic program guide processing device in accordance with an embodiment of the present invention.

Figure 4 is a flow diagram in accordance with an embodiment of the present invention, in which electronic program guide information is communicated from a set-top box configured to receive electronic program guide information to a digital video recorder comprising an electronic program guide subsystem.

Detailed Description of the Preferred Embodiment

Figure 1 schematically illustrates a digital video recorder 100 in accordance with an embodiment of the present invention. The digital video recorder 100 is connectable to a set-top box 110 configured to receive electronic program guide (EPG) information 120 and to receive broadcast audiovisual data 130. The set-top box 110 includes at least one auxiliary interface 140 that supports communication between the digital video recorder 100 and the set-top box 110. The digital video recorder 100 comprises a storage device 160 and at least one recorder interface 150 connectable to the auxiliary interface 140. The digital video recorder 100 further comprises an EPG subsystem 170 connected to the recorder interface 150 to receive the EPG information 120 from the set-top box 110 and to process the EPG information 120 to schedule recording the broadcast audiovisual data 130 on the storage device 160. In the preferred embodiment, the EPG subsystem 170 is resident with, and coupled to, a digital video recorder (DVR) microprocessor 230.

The set-top box 110 also includes a video input interface 180, a set-top box (STB) video output interface 190 connectable to a display device 200, a STB microprocessor 210, and a STB user interface 220. The video input interface 180 is configured to receive both the EPG information 120 and the broadcast audiovisual data 130, and is coupled to both the auxiliary interface 140 and the STB video output interface 190. The STB video output interface 190 is configured to provide output

1 video data when connected to the display device 200 (e.g., a television). The STB
2 microprocessor 210 receives EPG information 120 from the video input interface 180
3 and communicates with the digital video recorder 100 via the auxiliary interface 140. In
4 response to STB user input 225 received via the STB user interface 220, the STB
5 microprocessor 210 transmits signals to the video input interface 180 for channel
6 selection. The STB microprocessor 210 is also coupled to the STB video output
7 interface 190 in order to provide the user with broadcast schedule information in
8 response to the EPG information 120 and STB user input 225 when the STB video
9 output interface 190 is connected to the display device 200.

10 The digital video recorder 100 further comprises the DVR microprocessor 230, a
11 video data stream manager 240, a DVR video output interface 250, a DVR user
12 interface 260 that receives DVR user input 265, and a DVR command output interface
13 270. When connected to the auxiliary interface 140 of the set-top box 110, the recorder
14 interface 150 of the digital video recorder 100 receives both the EPG information 120
15 and the broadcast audiovisual data 130 from the set-top box 110. The recorder interface
16 150 transmits the EPG information 120 to the EPG subsystem 170 and transmits the
17 broadcast audiovisual data 130 to the video data stream manager 240.

18 The DVR microprocessor 230 is coupled to the recorder interface 150, the video
19 data stream manager 240, the DVR video output interface 250, the DVR user interface
20 260, and the DVR command output interface 270. The video data stream manager 240
21 is coupled to the storage device 160 and the DVR video output interface 250. In
22 response to the DVR user input 265 and the EPG information 120, the DVR
23 microprocessor 230 signals the video data stream manager 240 to control the recording
24 of broadcast audiovisual data 130 from the recorder interface 150 and the playback of
25 previously recorded audiovisual data from the storage device 160. The DVR command
26 output interface 270 is coupled to the STB user interface 220, thereby providing a
27 conduit for commands from the DVR microprocessor 230 to the STB microprocessor
28 210. Audiovisual data transmitted to the DVR video output interface 250 from the
29 video data stream manager 240 is displayed on the display device 200, which is coupled
30 to the DVR video output interface 250.

1 In one embodiment of the present invention, the EPG information 120 and the
2 broadcast audiovisual data 130 are transmitted to the set-top box 110 via a single cable
3 from a single source (e.g., a service provider that supply audiovisual programming to
4 multiple users). Examples of service providers include, but are not limited to, cable
5 television systems and satellite systems. The broadcast audiovisual data 130 is typically
6 in the form of signals that are communicated via a plurality of RF carriers that
7 correspond to multiple channels. The audiovisual programming may be communicated
8 as either analog signals or digital signals that modulate the RF carriers. Similarly, the
9 EPG information 120 is communicated as digital signals via at least one RF carrier. In
10 certain embodiments, the EPG information 120 may be a component of one or more
11 channels of the broadcast audiovisual data 130.

12 The video input interface 180 in the set-top box 110 receives the incoming
13 analog RF signals from the service provider and is configured to extract both the EPG
14 information 120 and the broadcast audiovisual data 130. Examples of video input
15 interfaces 180 which are configured to extract the broadcast audiovisual data 130,
16 whether in digital or analog form, are disclosed in the copending U.S. Patent
17 Application No. 09/585,249 (Attorney docket no. K35A0618), which is hereby
18 incorporated by reference. The video input interface 180 compatible with the preferred
19 embodiment is configured to similarly extract the EPG information 120. Alternatively,
20 the extraction of the EPG information 120 and broadcast audiovisual data 130 can be
21 performed by other system components, either upstream or downstream from the video
22 input interface 180. In the preferred embodiment, the video input interface 180
23 transmits the EPG information 120 and broadcast audiovisual data 130 to the auxiliary
24 interface 140. Persons skilled in the art are able to configure a video input interface 180
25 compatible with the present invention.

26 In the preferred embodiment of the present invention, the auxiliary interface 140
27 and the recorder interface 150 are compatible with the Universal Serial Bus (USB)
28 external bus standard. In other embodiments, the auxiliary interface 140 and recorder
29 interface 150 support isochronous communication compatible with the IEEE 1394
30 standard, which is described in the "IEEE Std 1394-1995 IEEE Standard for a High

Performance Serial Bus,” August 30, 1996, which is hereby incorporated by reference. In other embodiments, the auxiliary interface 140 and the recorder interface 150 are compatible with other external bus standards which include asynchronous or synchronous communication capabilities to communicate various commands and information between the digital video recorder 100 and the set-top box 110. The auxiliary interface 140 and the recorder interface 150 of the preferred embodiment are serial interfaces. In other embodiments, the auxiliary interface 140 and the recorder interface 150 are parallel interfaces. Besides providing a conduit for broadcast audiovisual data 130, the auxiliary interface 140 and the recorder interface 150 provide a conduit for EPG information and communication signals between the set-top box 110 and the digital video recorder 100.

The recorder interface 150 transmits the broadcast audiovisual data 130 to the video data stream manager 240, and transmits the EPG information 120 to the EPG subsystem 170. In response to signals from the DVR microprocessor 230, the video data stream manager 240 transmits the broadcast audiovisual data 130 to be recorded to the storage device 160 and transmits the audiovisual data to be displayed to the display device 200 via the DVR video output interface 250, thereby controlling the recording and playback of audiovisual data in response to signals from the DVR microprocessor 230. An example of a video data stream manager 240 which transmits and receives audiovisual data using the storage device 160 is disclosed by the copending U.S. Patent Application No. 09/585,249 (Attorney docket no. K35A0618), which has been incorporated by reference hereabove. The video data stream manager 240 compatible with the preferred embodiment illustrated in Figure 1 is also configured to transmit audiovisual data to be displayed to the DVR video output interface 250. Persons skilled in the art are able to configure a video data stream manager 240 compatible with the present invention.

The DVR video output interface 250 receives the audiovisual data from the video data stream manager 240 and receives EPG information 120 from the DVR microprocessor 230. The DVR video output interface 250 generates an appropriate display signal, which is transmitted to the display device 160. Examples of video

1 output interfaces which can serve as a DVR video output interface 250 compatible with
2 the present invention are disclosed by the copending U.S. Patent Application No.
3 09/585,249 (Attorney docket no. K35A0618), which has been incorporated by reference
4 hereabove. Persons skilled in the art are able to configure a DVR video output interface
5 250 compatible with the present invention.

6 The storage device 160 of the preferred embodiment illustrated in Figure 1 is a
7 rotating storage drive (e.g., a hard disk drive). Alternatively, the storage device 160 can
8 be a writable digital video disk (DVD) drive, or a device that utilizes another
9 technology that provides writable non-volatile storage.

10 The DVR microprocessor 230 of the preferred embodiment utilizes the results
11 from a preference determination engine, as well as DVR user input 265, to control the
12 operation of both the digital video recorder 100 and the set-top box 110. The preference
13 determination engine is an algorithm, enabled in hardware, software, or both, which
14 monitors a user's viewing patterns to create a user profile of the user's watching
15 preferences. In the preferred embodiment, the preference determination engine is resident
16 in the DVR microprocessor 230. Based on the user profile and the EPG information 120
17 for the upcoming program schedule, the preference determination engine recommends
18 particular television programs which the user may be interested in watching. These
19 recommendations assist users to schedule their recording schedules by alerting them to
20 upcoming programs of interest. In certain embodiments, the digital video recorder 100
21 can be configured to automatically record these programs without further input from the
22 user. An example of a preference determination engine is MbTV™ sold by Metabyte
23 Networks, Inc. of Fremont, CA.

24 The DVR microprocessor 230 accesses the EPG information 120 from the EPG
25 subsystem 170. The DVR microprocessor 230 also communicates user requests and
26 other commands to the video data stream manager 240, and provides information,
27 including EPG information 120, to the DVR video output interface 250 to be displayed
28 to the user.

29 In addition, the DVR microprocessor 230 communicates with the STB
30 microprocessor 210. In the preferred embodiment, this communication includes signals

1 transmitted across the recorder interface 150 and the auxiliary interface 140. Another
2 conduit of communication is the DVR command output interface 270, which is coupled
3 to the STB user interface 220. One example of such a DVR output command interface
4 270 is an "IR Blaster" which, in response to the DVR microprocessor 230, generates
5 infrared signals which are transmitted to an infrared STB user interface 220. In this
6 way, the STB microprocessor 210 is effectively slaved to the DVR microprocessor 230.

7 Figure 2 schematically illustrates an EPG subsystem 170 compatible with the
8 preferred embodiment of the present invention. The EPG subsystem 170 comprises an
9 EPG processor 280, an EPG manager 290, and an EPG storage buffer 300. The EPG
10 processor 280 communicates with the STB microprocessor 210 via a communications
11 protocol which utilizes messages transmitted across the recorder interface 150 and the
12 auxiliary interface 140 to transfer EPG information 120 from the set-top box 110 to the
13 digital video recorder 100. In certain embodiments, the EPG processor 280 can decode
14 encoded EPG information 120, enact compression/decompression utilities to optimize
15 the storage and transfer of EPG information 120, or perform other process operations on
16 the EPG information 120 from the set-top box 110. In such embodiments, the user is
17 presented with processed EPG information.

18 The EPG manager 290 compiles the EPG information 120 received from the set-
19 top box 110 into a database, which is stored in the EPG storage buffer 300. The EPG
20 manager 290 accesses the EPG information 120 stored in the EPG storage buffer 300 in
21 response to commands from the DVR microprocessor 230, and makes requested EPG
22 information 120 available to the DVR microprocessor 230. The DVR microprocessor
23 230 utilizes the EPG information 120 to provide the user with broadcast scheduling
24 information and to provide the preference determination engine with the EPG
25 information 120 required to compile a user profile of the user's watching preferences
26 and to enable automatic recording of programs of interest. In this way, the EPG
27 manager 290 processes the EPG information 120 to schedule recording the broadcast
28 audiovisual data 130 on the storage device 160. In the preferred embodiment, the EPG
29 storage buffer 300 is stored on the storage drive 160. Alternatively, in other

1 embodiments, the EPG storage buffer 300 is stored in whole or in part in random-access
2 memory resident with the DVR microprocessor 230.

3 By accessing the EPG information 120 that is transmitted to set-top boxes 110
4 by service providers, the digital video recorder 100 of the preferred embodiment does
5 not require a modem to receive EPG information 120 from a third-party source.
6 Therefore, the digital video recorder 100 avoids the complexity and costs associated
7 with prior art digital video recording systems. Furthermore, the service provider
8 remains in control of the information displayed to the user because the digital video
9 recorder 100 utilizes the EPG information 120 received from the service provider, as
10 opposed to a third-party source. By maintaining control by the service provider, the
11 format of the broadcast scheduling information can then be similar to the format
12 presented by the set-top box 110 in video systems without a digital video recorder 100.
13 The similarity between formats provides a more seamless transition for the user upon
14 adding a digital video recorder 100 to the user's video system. This retention of control
15 by the service provider can be particularly important economically in embodiments in
16 which advertising information is transmitted to the digital video recorder 100 along with
17 the EPG information 120 (i.e., where control of what the user is viewing can be
18 translated into advertising revenue and opportunities for pay-per-view sales).

19 In the preferred embodiment, the STB microprocessor 210 continually monitors
20 the EPG information 120 received by the video input interface 180, and stores a portion
21 of the EPG information 120 in RAM resident with the STB microprocessor 210. When
22 the STB microprocessor 210 detects that new or updated EPG information 120 has been
23 received, the STB microprocessor 210 stores the new or updated EPG information 120
24 in resident RAM, and sends a "New EPG data available" message to the EPG processor
25 280, which responds by returning an "Acknowledge response" message. After the EPG
26 processor 280 has been informed that there is new or updated EPG information 120
27 available, the EPG processor 280 can request that the new or updated EPG information
28 120 be sent by the STB microprocessor 210 to the EPG processor 280 by sending an
29 "EPG data request" message to the STB microprocessor 210. The STB microprocessor
30 210 responds by sending an "EPG data response" message which contains the requested

1 new or updated EPG information 120. In this way, the digital video recorder 100 is
2 continually provided with up-to-date EPG information as soon as such information is
3 transmitted to the set-top box 110 by the service provider. This continuous and timely
4 updating of the EPG information 120 used by the digital video recorder 100 is in
5 contrast to prior art digital recording systems which only provide periodic updates (e.g.,
6 daily) of EPG information. Other communication protocols between the EPG processor
7 280 and the STB microprocessor 210 are compatible with the present invention.
8 Persons skilled in the art are able to select an appropriate communications protocol to
9 practice the present invention.

10 In other embodiments compatible with the present invention, an electronic
11 program guide (EPG) processing device 310 is used in conjunction with a set-top box
12 110, as schematically illustrated in Figure 3. The EPG processing device 310 is
13 connectable to a set-top box 110 configured to receive EPG information 120. The set-
14 top box 110 includes at least one auxiliary interface 140 that supports communication
15 between the EPG processing device 310 and the set-top box 110. The EPG processing
16 device 310 comprises at least one device interface 320 connectable to the auxiliary
17 interface 140. The EPG processing device 310 further comprises an EPG subsystem
18 170 connected to the device interface 320 to receive and process the EPG information
19 120 from the set-top box 110. In the embodiment illustrated in Figure 3, the EPG
20 subsystem 170 is resident with, and coupled to, a user viewing monitor 330.

21 In certain embodiments in which the EPG processing device 310 has access to a
22 storage device, the EPG processing device 310 can comprise a digital video recorder
23 similar to the embodiment schematically illustrated in Figure 1. In alternative
24 embodiments without a storage drive, the EPG processing device 310 can be used to
25 monitor the viewing history and preferences of the user.

26 The EPG processing device 310 in Figure 3 accesses the EPG information 120
27 from the set-top box 110 in a substantially similar manner as the digital video recorder
28 100 described above. The EPG processing device 310 further comprises the user
29 viewing monitor 330 coupled to a processing device output interface 340. The user
30 viewing monitor 330 communicates with the STB microprocessor 210 via the device

1 interface 320 and the auxiliary interface 140 to request EPG information 120 to be
2 transmitted to the EPG subsystem 170 from the set-top box 110. The user viewing
3 monitor 330 also utilizes the EPG information 120 from the EPG subsystem 170 to
4 monitor the viewing history and preferences of the user, thereby compiling user
5 information. In the embodiment schematically illustrated in Figure 3, the user viewing
6 monitor 330 comprises a processing device microprocessor 330. The output from the
7 processing device microprocessor 330 is transmitted to the processing device output
8 interface 340 which is coupled to a repository of such user information. In certain
9 embodiments, the user information is transmitted to the service provider across the same
10 cable which provides the EPG information 120 and the broadcast audiovisual data 130.
11 Alternatively, the user information is transmitted across a separate cable.

12 Figure 4 is a flow diagram in accordance with an embodiment of the present
13 invention, in which EPG information 120 is communicated from a set-top box 110
14 configured to receive EPG information 120 to a digital video recorder 100 comprising
15 an EPG subsystem 170. In certain embodiments, the EPG subsystem 170 includes a
16 EPG storage buffer in which the EPG information 120 is stored. As described above,
17 the EPG information 120 can be transmitted from the same source as the broadcast
18 audiovisual data 130, and can be received by the input interface 180 of the set-top box
19 110. In certain embodiments, the EPG information 120 is included in the broadcast
20 audiovisual data 130. The flow diagram is described with reference to the digital video
21 recorder 100 and set-top box 110 illustrated in Figure 1. Persons skilled in the art are
22 able to recognize that, while the flow diagram illustrates a particular embodiment with
23 steps in a particular order, other embodiments with different orders of steps are also
24 compatible with the present invention.

25 In a step 410, the recorder interface 150 of the digital video recorder 100 is
26 connected to the auxiliary interface 140 of the set-top box 110, the recorder interface
27 150 being connected to the EPG subsystem 170. This connection of the recorder
28 interface 150 to the auxiliary interface 140 provides a conduit for communication
29 between the STB microprocessor 210 and the DVR microprocessor 230, broadcast
30 audiovisual data 130, and EPG information 120.

1 In a step 420, the connection of the digital video recorder 100 to the set-top box
2 110 is recognized by the STB microprocessor 210 through communication between the
3 STB microprocessor 210 and the DVR microprocessor 230. In the preferred
4 embodiment of the present invention, this communication is in the form of messages
5 sent from the DVR microprocessor 230 to the STB microprocessor 210.

6 In a step 430, the EPG information 120 is communicated from the set-top box
7 110 to the EPG subsystem 170. In certain embodiments, the EPG subsystem receives
8 updated EPG information 120 from the set-top box 110, where the set-top box 110 is
9 configured to detect updated EPG information 120. As described above, in certain
10 embodiments the EPG subsystem 170 receives EPG information 120 that is selectively
11 transmitted by the set-top box 110 via the auxiliary interface 140 and the recorder
12 interface 150. Additionally, in certain embodiments, this selective transmitting of the
13 EPG information 120 by the set-top box 110 is in response to a request signal
14 transmitted by the EPG subsystem 170, or in response to user input.

1 WHAT IS CLAIMED IS:

2 1. A digital video recorder connectable to a set-top box configured to
3 receive electronic program guide information and broadcast audiovisual data, the set-top
4 box including at least one auxiliary interface that supports communication between the
5 digital video recorder and the set-top box, the digital video recorder comprising:

6 at least one recorder interface connectable to the auxiliary interface;

7 a storage device; and

8 an electronic program guide subsystem connected to the recorder
9 interface to receive the electronic program guide information from the set-top
10 box and to process the electronic program guide information to schedule
11 recording the broadcast audiovisual data on the storage device.

1 2. The digital video recorder of Claim 1, wherein the electronic program
2 guide subsystem comprises an electronic program guide processor.

1 3. The digital video recorder of Claim 2, wherein the electronic program
2 guide subsystem further comprises an electronic program guide manager.

1 4. The digital video recorder of Claim 1, wherein the electronic program
2 guide subsystem further comprises an electronic program guide storage buffer to store
3 the electronic program guide information.

1 5. The digital video recorder of Claim 1, wherein the electronic program
2 guide subsystem is configured to present processed electronic program guide
3 information to a user.

1 6. The digital video recorder of Claim 1, wherein the digital video recorder
2 receives the electronic program guide information and the broadcast audiovisual data
3 from a single source.

1 7. The digital video recorder of Claim 6, wherein the single source is the
2 set-top box.

1 8. The digital video recorder of Claim 6, wherein the digital video recorder
2 receives the electronic program guide information and the broadcast audiovisual data
3 via a single interface.

1 9. The digital video recorder of Claim 6, wherein the digital video recorder
2 receives the electronic program guide information as a component of one or more
3 channels of the broadcast audiovisual data.

1 10. The digital video recorder of Claim 1, wherein the electronic program
2 guide subsystem is configured to receive updated electronic program guide information
3 from the set-top box, where the set-top box is configured to detect updated electronic
4 program guide information.

1 11. The digital video recorder of Claim 1, wherein the electronic program
2 guide subsystem is configured to receive electronic program guide information
3 selectively transmitted by the set-top box via the auxiliary interface and the recorder
4 interface.

1 12. The digital video recorder of Claim 11, wherein the electronic program
2 guide subsystem is configured to transmit a request signal to the set-top box, where the
3 set-top box is configured to selectively transmit the electronic program guide
4 information to the electronic program guide subsystem in response to the request signal.

1 13. The digital video recorder of Claim 1, wherein the at least one auxiliary
2 interface supports isochronous communication.

1 14. The digital video recorder of Claim 1, wherein the at least one auxiliary
2 interface supports asynchronous communication.

1 15. The digital video recorder of Claim 1, wherein the at least one auxiliary
2 interface supports synchronous communication.

1 16. The digital video recorder of Claim 1, wherein the at least one recorder
2 interface supports isochronous communication.

1 17. The digital video recorder of Claim 1, wherein the at least one recorder
2 interface supports asynchronous communication.

1 18. The digital video recorder of Claim 1, wherein the at least one recorder
2 interface supports synchronous communication.

1 19. An electronic program guide processing device connectable to a set-top
2 box configured to receive electronic program guide information, the set-top box
3 including at least one auxiliary interface that supports communication between the
4 electronic program guide processing device and the set-top box, the electronic program
5 guide processing device comprising:

6 at least one device interface connectable to the auxiliary interface; and
7 an electronic program guide subsystem connected to the device interface
8 to receive and process the electronic program guide information from the set-top
9 box.

1 20. The electronic program guide processing device of Claim 19, wherein
2 the electronic program guide processing device comprises a digital video recorder.

1 21. The electronic program guide processing device of Claim 19, wherein
2 the electronic program guide processing device comprises a user viewing monitor that
3 keeps track of and compiles a user viewing history and set of user preferences.

1 22. A method for communicating electronic program guide information from
2 a set-top box configured to receive the electronic program guide information to a digital
3 video recorder comprising an electronic program guide subsystem, the method
4 comprising:

5 connecting at least one recorder interface of the digital video recorder to
6 at least one auxiliary interface of the set-top box, the recorder interface
7 connected to the electronic program guide subsystem;

8 recognizing the connection of the digital video recorder to the set-top
9 box; and

10 communicating the electronic program guide information from the set-
11 top box to the electronic program guide subsystem.

1 23. The method of Claim 22, wherein the electronic program guide
2 information and broadcast audiovisual data are transmitted to the set-top box from a
3 single source.

1 24. The method of Claim 23, wherein the electronic program guide
2 information and the broadcast audiovisual data are received by an input interface of the
3 set-top box.

1 25. The method of Claim 23, wherein the electronic program guide
2 information is included in the broadcast audiovisual data.

1 26. The method of Claim 22, wherein the electronic program guide
2 subsystem receives updated electronic program guide information from the set-top box,
3 where the set-top box is configured to detect updated electronic program guide
4 information.

1 27. The method of Claim 22, wherein the electronic program guide
2 subsystem receives electronic program guide information selectively transmitted by the
3 set-top box via the auxiliary interface and the recorder interface.

1 28. The method of Claim 27, wherein the electronic program guide
2 subsystem transmits a request signal to the set-top box, and the set-top box selectively
3 transmits the electronic program guide information to the electronic program guide
4 subsystem in response to the request signal.

1 29. The method of Claim 27, wherein the transmitting of the electronic
2 program guide information from the set-top box is performed selectively in response to
3 user input.

1 30. The method of Claim 22, wherein the method further comprises storing
2 the electronic program guide information in an electronic program guide storage buffer
3 of the electronic program guide subsystem.

**ELECTRONIC PROGRAM GUIDE SUBSYSTEM FOR RECEIVING AND
PROCESSING ELECTRONIC PROGRAM GUIDE INFORMATION FROM A
SET-TOP BOX**

Abstract of the Disclosure

An electronic program guide processing device is connectable to a set-top box configured to receive electronic program guide information. The set-top box includes at least one auxiliary interface that supports communication between the electronic program guide processing device and the set-top box. The electronic program guide processing device includes at least one device interface connectable to the auxiliary interface. The electronic program guide processing device further includes an electronic program guide subsystem connected to the device interface to receive and process the electronic program guide information from the set-top box. In one aspect, a digital video recorder is connectable to a set-top box configured to receive electronic program guide information and broadcast audiovisual data. The set-top box includes at least one auxiliary interface that supports communication between the digital video recorder and the set-top box. The digital video recorder includes at least one recorder interface connectable to the auxiliary interface, and includes a storage device. The digital video recorder further includes an electronic program guide subsystem connected to the recorder interface to receive the electronic program guide information from the set-top box and to process the electronic program guide information to schedule recording the broadcast audiovisual data on the storage device.

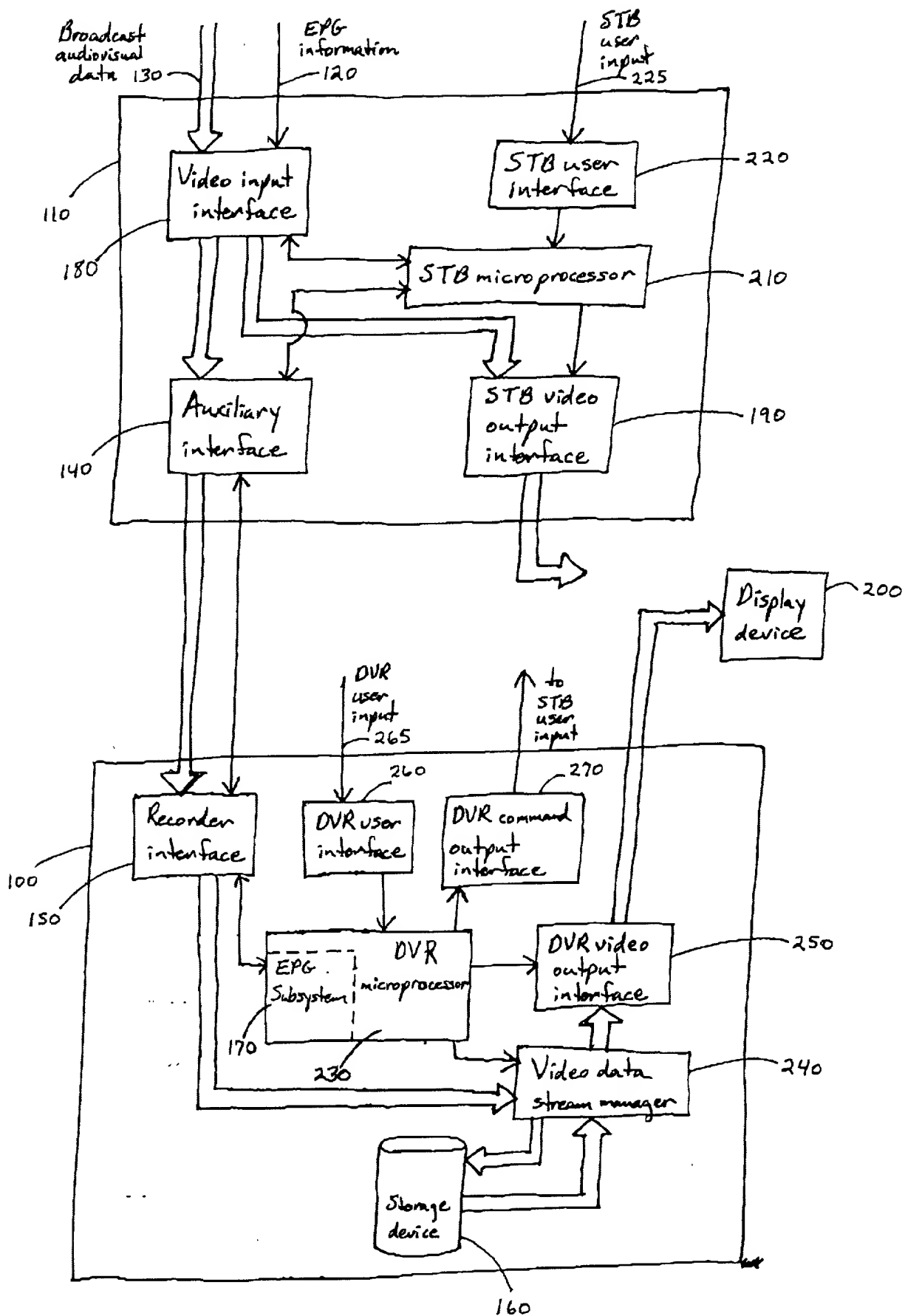


Figure 1

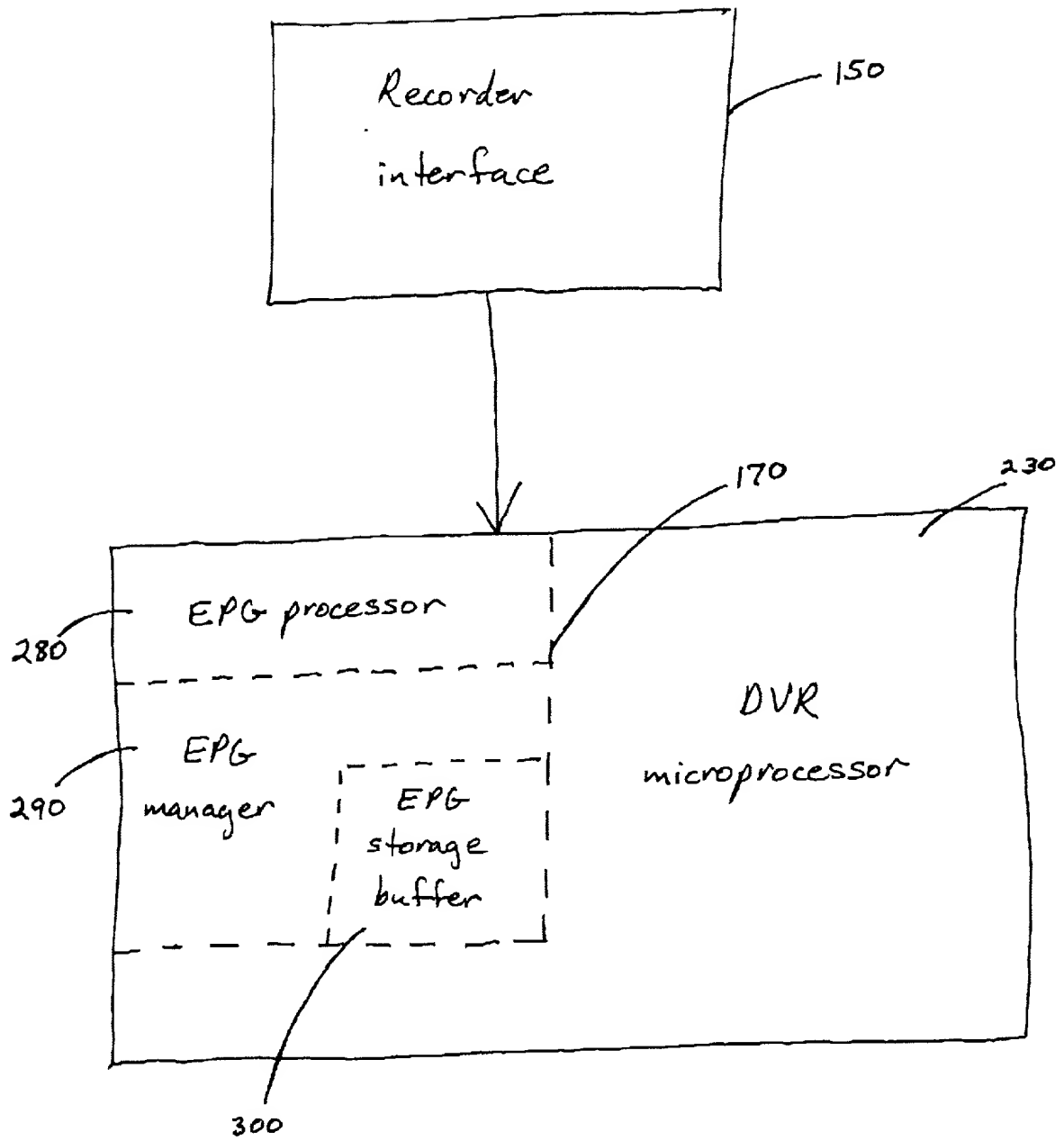


Figure 2

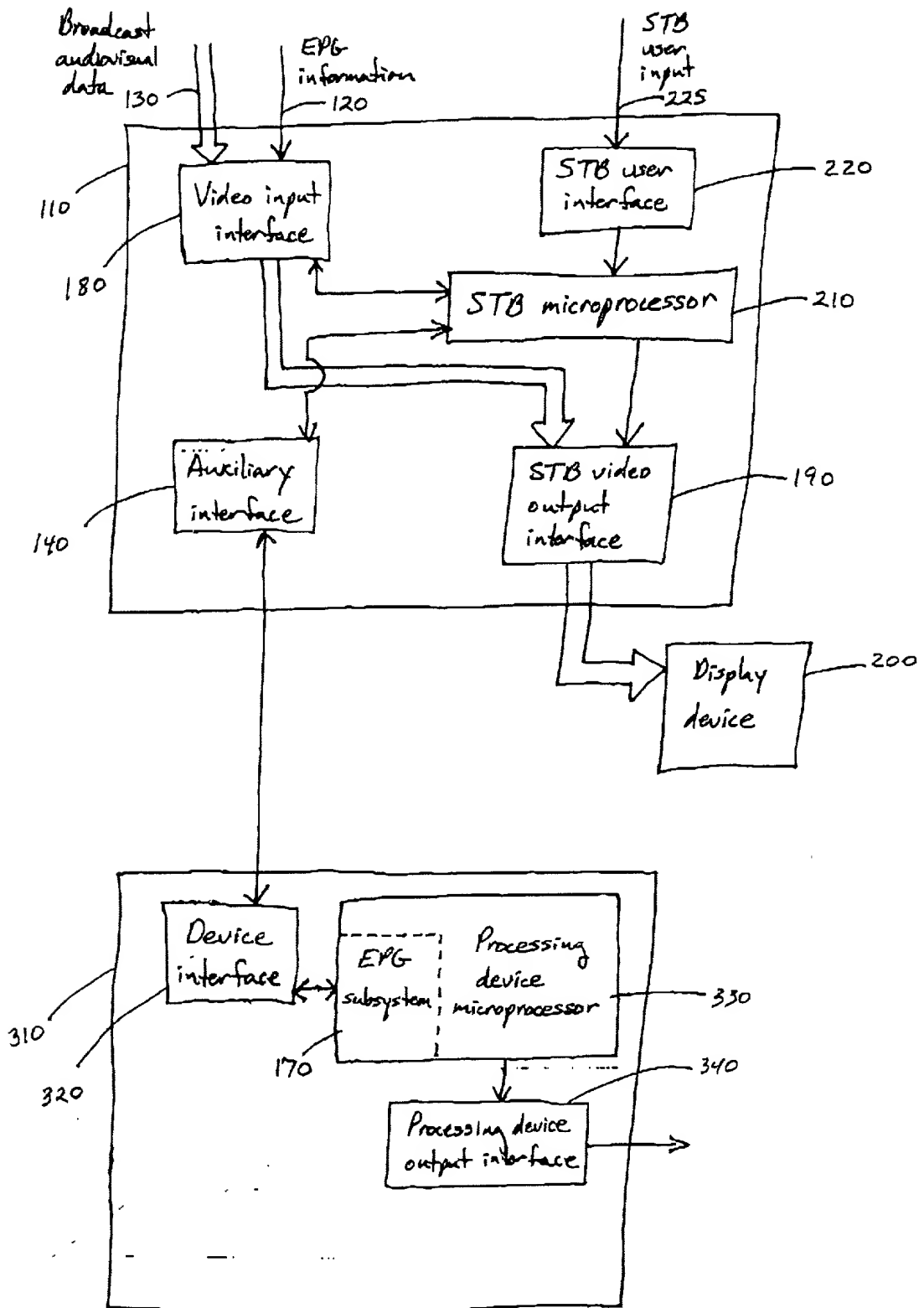


Figure 3

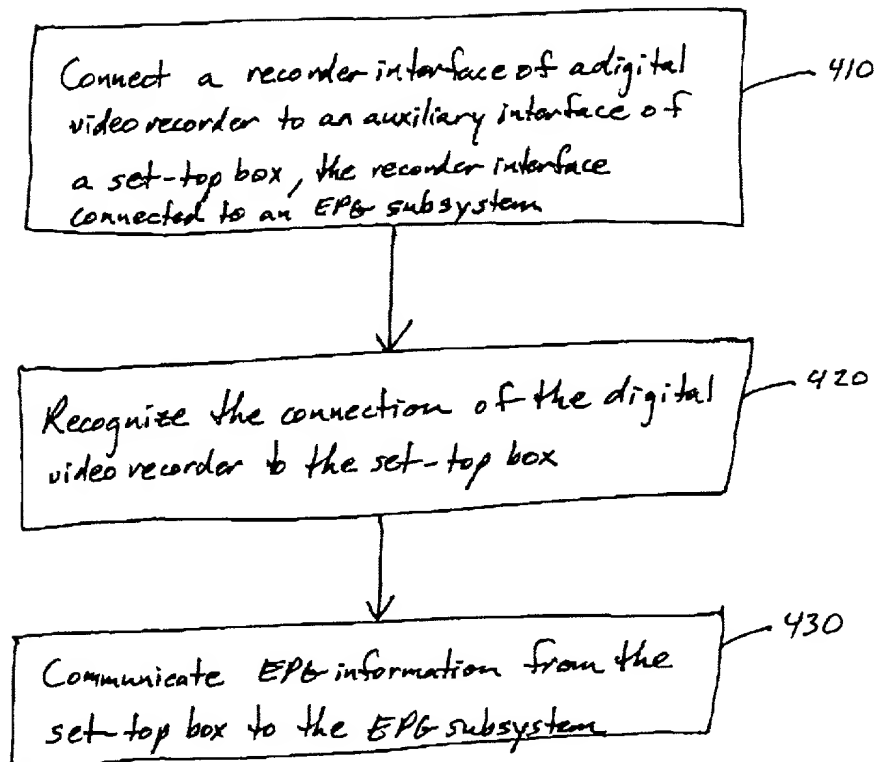


Figure 4